

| UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17) | | | | | | |
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| Predmet: | | Osnove umetne inteligence | | | | |
| Course title: | | Introduction to artificial intelligence | | | | |
| Študijski program in stopnja Study programme and level | | Študijska smer Study field | | Letnik Academic year | Semester Semester | |
| Interdisciplinarni univerzitetni študijski program Računalništvo in matematika | | ni smeri | | 3 | prvi | |
| Interdisciplinary first cycle academic study programme Computer Science and Mathematics | | none | | 3 | first | |
| Vrsta predmeta / Course type | | | | obvezni / compulsory | | |
| Univerzitetna koda predmeta / University course code: | | | | 63214 | | |
| Predavanja Lectures | Seminar Seminar | Vaje Tutorial | Klinične vaje work | Druge oblike študija | Samost. delo Individ. work | ECTS |
| 45 | | 30 | | | 105 | 6 |
| Nosilec predmeta / Lecturer: | | prof. dr. Ivan Bratko | | | | |
| Jeziki / Languages: | | Predavanja / Lectures: | | slovenski / Slovene | | |
| | | Vaje / Tutorial: | | slovenski / Slovene | | |
| Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti: | | | | Prerequisites: | | |
| Vpis v letnik študija. | | | | Enrolment in the programme. | | |
| Vsebina: | | | | Content (Syllabus outline): | | |

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| <p>Uvod v umetno inteligenco in primeri uporabe</p> <p>Prostor stanj in osnovni algoritmi preiskovanja: globinsko, širinsko, iterativno poglobljanje, zahtevnost teh algoritmov</p> <p>Hevristično preiskovanje, algoritma A* in IDA*, izrek o popolnosti A*, lastnosti ocenitvenih funkcij ter analiza časovne in prostorske zahtevnosti</p> <p>Dekompozicija problemov z AND/OR grafi, algoritmi iskanja v AND/OR grafi, hevristično preiskovanje in algoritem AO*</p> <p>Strojno učenje: problem učenja iz podatkov, iskanje zakonitosti v podatkih in podatkovno rudarjenje, opisni jeziki in prostori hipotez, učenje odločitvenih dreves, regresijskih dreves, modelnih dreves, ter pravil. Programska orodja strojnega učenja in primeri uporabe.</p> <p>Predstavitev znanja in ekspertni sistemi: predstavitev znanja s pravili, ogrodji, semantičnimi mrežami, ontologije, algoritmi sklepanja in generiranje razlage, obravnavanje negotovega znanja, bayesovske mreže</p> <p>Planiranje po principu sredstev in ciljev, planiranje s popolno in delno urejenostjo, regresiranje ciljev, primeri uporabe v robotiki in logistiki</p> | <p>Introduction to Artificial Intelligence, examples of applications</p> <p>State space and basic search algorithms: depth-first, breadth-first and iterative deepening, complexity of these algorithms</p> <p>Heuristic search, algorithms A* and IDA*, admissibility theorem for A*, properties of heuristic function and analysis of time and space complexity</p> <p>Problem decomposition with AND/OR graphs, search in AND/OR graphs, heuristic search algorithm AO*</p> <p>Machine learning: problem of learning from data, data mining, description languages and hypothesis spaces, induction of decision trees, regression trees, model trees, and rules. Software tools for machine learning and applications.</p> <p>Knowledge representation and expert systems: knowledge representation with rules, frames, semantic networks, ontologies, inference algorithms and generating explanation, handling uncertain knowledge, Bayesian networks</p> <p>Means-ends planning, total-order and partial-order planning, goal regression, applications in robotics and logistics</p> |
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Temeljni literatura in viri / Readings:

I. Bratko, Prolog Programming for Artificial Intelligence, 4th edition, Pearson Education, Addison-Wesley 2011, ISBN: 0201403757.

S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, Third edition, Pearson

Education, Prentice-Hall 2010, ISBN: 0136042597.

I. Bratko, Prolog in umetna inteligenca, Založba FE in FRI, ponatis 2011.

I. Kononenko, Strojno učenje, Založba FE in FRI, 2005.

Materiali na spletu (Spletna učilnica FRI, Ivan Bratko home page): Prosojnice predavanj, naloge.

Cilji in kompetence:

Seznanimi slušatelje z osnovnimi koncepti, idejami, metodami in tehnikami umetne inteligence

Sposobnost reševanja problemov z metodami umetne inteligence

Zmožnost razumevanja literatura s področja umetne inteligence

Prispevati k razumevanju relevantnosti tehničnih dosežkov umetne inteligence glede na njihove implikacije v filozofiji in psihologiji

Objectives and competences:

Teach basic concepts, ideas, methods and techniques of artificial intelligence (AI)

Ability to solve problems with methods of artificial intelligence

Ability to understand the literature in the area of AI

Contribute to the understanding of the relevance of technical achievements of AI with respect to their implications in philosophy and psychology

Predvideni študijski rezultati:

Znanje in razumevanje:

Poznavanje glavnih omrežnih modelov (TCP/IP in ISO/OSI). Razumevanje razlike med arhitekturo in strukturo. Poznavanje in ločevanje funkcionalnosti posamezne plasti. Sposobnost umestitve konkretnega problema na ustrezno plast v modelu.

Uporaba:

Uporaba omrežnih protokolov in storitev v svojih izvedbah.

Intended learning outcomes:

Knowledge and understanding:

The student recognises and understands the most frequently applied techniques of AI

Application:

The students is capable of applying methods of AI in the planning and development of concrete computer applications in various application areas

Reflection:

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| <p>Refleksija:</p> <p>Spoznavanje in razumevanje medsebojne soodvisnosti plasti v različnih večplastnih modelih omrežij in povezava s konkretnimi izvedbami.</p> <p>Prenosljive spretnosti - niso vezane le na en predmet:</p> <p>Reševanje različnih problemov na osnovi večplastnih arhitekturnih modelov storitev. Reševanje različnih problemov na osnovi različnih strukturnih modelov omrežij in topologij.</p> | <p>The student is capable of judging the implications of technical achievements of AI regarding the possibilities and limitations in computer applications, the limits of computer intelligence, similarities and differences with human intelligence, and some questions of cognitive science.</p> <p>Transferable skills:</p> <p>Skills are not limited to one subject, the student is capable of applying the learned methods in the development of computer applications and systems in general.</p> |
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Metode poučevanja in učenja:

Predavanja, laboratorijske vaje, domače naloge, individualni ali skupinski projekti

Learning and teaching methods:

Lectures, laboratory exercises, homework, individual and team projects

Načini ocenjevanja:

Delež (v %) /
Weight (in %)

Assessment:

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| <p>Način (pisni izpit, ustno izpraševanje, naloge, projekt):</p> <p>Sprotno preverjanje (domače naloge, kolokviji in projektno delo)</p> <p>Končno preverjanje (pisni in ustni izpit)</p> <p>Ocene: 6-10 pozitivno, 1-5 negativno (v skladu s Statutom UL)</p> | <p>50%</p> <p>50%</p> | <p>Type (examination, oral, coursework, project):</p> <p>Continuing (homework, midterm exams, laboratory exercises)</p> <p>Final (written or oral exam)</p> <p>Grading: 6-10 pass, 1-5 fail.</p> |
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Reference nosilca / Lecturer's references:

BRATKO, Ivan. Prolog programming for artificial intelligence. 4th ed. Harlow (England) [etc.]: Addison-Wesley: Pearson, cop. 2012. XXI, 673 str., ilustr. ISBN 978-0-321-41746-6. ISBN 0-321-

41746-1. [COBISS.SI-ID 8577364]

MOŽINA, Martin, ŽABKAR, Jure, BRATKO, Ivan. Argument based machine learning. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2007, vol. 171, no. 10/15, str. 922-937. [COBISS.SI-ID 6240084]

LUŠTREK, Mitja, GAMS, Matjaž, BRATKO, Ivan. Is real-valued minimax pathological?. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2006, vol. 170, str. 620-642. [COBISS.SI-ID 19805735]

ŠUC, Dorian, VLADUŠIČ, Daniel, BRATKO, Ivan. Qualitatively faithful quantitative prediction. Artificial intelligence, ISSN 0004-3702. [Print ed.], 2004, vol. 158, no. 2, str. [189]-214, ilustr. [COBISS.SI-ID 4422740]

BRATKO, Ivan, MOZETIČ, Igor, LAVRAČ, Nada. Kardio : a study in deep and qualitative knowledge for expert systems. Cambridge (Mass.), London: The MIT Press, 1989. XIV, 260 str., graf. prikazi. ISBN 0-262-02273-7. [COBISS.SI-ID 19925760]